

## 6-4 Water Quality Sampling and Reporting Procedures

The following procedures have been developed to document compliance with local, state, and federal permit conditions; and conditions of the *Implementing Agreement Between the Washington State Department of Ecology and the Washington State Department of Transportation Regarding Compliance with the State of Washington Surface Water Quality Standards* (Implementing Agreement). These procedures are also used to evaluate the effectiveness of BMPs.

All projects with greater than 1 acre of soil disturbance (except federal and tribal land) that may discharge construction stormwater to waters of the state are required to seek coverage under the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit. Sampling guidance for meeting permit requirements can be found in Section 6-8.

Sampling guidance for in-water work projects that are issued a 401 Certification can be found in Section 6-9.


Projects that require additional permit conditions should contact region environmental and HQ Environmental Services Office staff to incorporate additional sampling parameters into these protocols.

## 6-5 Standard Sampling Procedures

### 1. Sampling Equipment

All regions use the following water quality sampling equipment. This equipment was selected for the purpose of legal compliance and should be maintained to document the project conditions and legal records of WSDOT construction activities.

Conditions/Procedures	Sampling Equipment
Turbidity	Hach Model 2100 p portable turbidimeter with sampling bottles
pH and temperature	Hach Model SensION portable pH meter or HQ11D pH meter
Water sampling	Rod & cup (12-foot extendable)
Rain measurement	Gage – Tru-Check brand or equivalent installed on-site
Field observations	Field notebook/recording equipment

Company	Product	Approximate Cost
Hach Company* (970) 669-3050  <a href="http://www.hach.com">www.hach.com</a>	2100 p Turbidimeter SensION1 pH Meter or HQ11D pH Meter with pH301 Liquid filled pH electrode	\$850 \$500 \$500

(\*or any major scientific supply distributor)

## 2. Equipment Calibration

Calibrate equipment according to manufacturers' recommendations and specified schedules. Calibration frequency must follow the manufacturers' recommendations, at a minimum, for data to be legally defensible. Additional calibrations should be performed immediately if data appear suspect.

## 3. Field Equipment Checklist

- ☐ Sampling cup/rod or hip waders
- ☐ Turbidity equipment (check batteries and sampling supplies)
- ☐ pH equipment (check batteries and sampling supplies)
- ☐ Distilled water for rinsing equipment.
- ☐ Long survey stakes, hammer, and marking pen (initial set-up only)
- ☐ Rain gage
- ☐ WSDOT-approved safety vest and hardhat
- ☐ Camera
- ☐ Field notebook or data sheets (available at <http://www.wsdot.wa.gov/Environment/WaterQuality/ErosionControl.htm>) for recording sampling data and field conditions
- ☐ Cellular phone and contact phone numbers

## 4. Sampling Station Setup

When setting up sampling stations:

- ☐ Mark all sampling station locations with clearly labeled survey stakes.
- ☐ Photograph each sampling station for future reference and reporting. Picture(s) should show a good relationship between the project, the sampling station, and the surrounding environment.
- ☐ If sampling outside WSDOT right-of-way, survey stake locations should be within WSDOT right-of-way with direction and distance

labels to the exact sampling point locations. Record the exact sampling point location in the field notebook and in the TESC plan.

## **5. Create Base/Site Map**

Develop a relatively small-scale map depicting the project, sampling locations, and major water, land, and road characteristics. Keep the map in the field notebook so that other staff can understand the locations and access the sampling stations. Monitoring locations should also be drawn onto the TESC plan sheets.

## **6. Sampling Information**

The following information is recorded in the field notebook (or on the data recording sheets) for each sampling event:

- Date, time, and location of the sample
- Project name and contract number
- Name(s) of personnel who collected the sample
- Amount of rainfall in the last 24 hours
- Field conditions (weather, temperature, pertinent construction activities, any prior disturbance of the water body, etc.)
- Testing results for measured parameters
- Date and time of the last calibration of sampling equipment
- Notes summarizing critical activities, unusual conditions, corrective actions, whether or not photographs were taken as supporting documentation, etc.

## **7. Sampling Procedures**

The following sampling procedures must be used:

- In-water work: Sampling begins at the downstream station first followed by the upstream location, to avoid contamination. Testing of samples should occur at the designated sampling station whenever possible.
- Collect samples that are representative of the flow and characteristic of the discharge. Use the sampling rod if necessary.
- Fill the sampling bottle (downstream) at least once prior to collecting the sample, to remove possible contaminants. Invert the sample bottle to re-suspend particulates prior to turbidity testing.

- pH sampling should occur prior to turbidity testing, as temperature affects pH.
- Follow the manufacturers' recommendations for equipment operations.

## **6-6 Office Data Recording and Analysis**

WSDOT has developed a Water Quality Monitoring Database (see Section 2-3.2.1) that all projects must use to input water quality data. For in-water work projects and other non-NPDES General Construction permitted projects, the database automatically calculates water quality standards based on the receiving water body and non-complying events are flagged, prompting the user to initiate Environmental Compliance Assurance Procedures (ECAP). For projects with NPDES General Construction permits, the database automatically flags benchmark non-compliance and prompts the user to follow steps identified in the NPDES permit. For a brief training, contact region environmental or the Environmental Services Office 360-570-6649.

## **6-7 Reporting Sampling Results and Compliance Issues**

The NPDES Construction Stormwater General Permit requires that data be submitted monthly for all projects greater than 5 acres of soil disturbance after October 1, 2006. The HQ Environmental Services Office will batch send data to Ecology monthly via the Water Quality Monitoring Database. Therefore, all projects must be entering water quality data into the database as data is collected.

Data collected during in-water work projects must also be reported to resource agencies per the 401 Certification. The Water Quality Monitoring database can generate graphs of water quality data showing both upstream, downstream data along with the state standard. These graphs can be sent via e-mail to the person at Ecology designated in the permit.

If a turbidity or pH sample is out of compliance (in-water work) or exceeds the benchmarks (NPDES monitoring), ECAP should be filed as soon as possible. Once the data is entered into the Water Quality Monitoring Database, it will prompt you to file ECAP if it has not been filed already.

### **Additional Project Water Quality Sampling**

If construction stormwater will be discharging to a 303(d) or a TMDL listed water body, or if there is a NPDES Individual Stormwater Permit that requires additional sampling, contact the region's environmental personnel and the HQ Environmental Services Office at 360-570-6649 or 360-570-6648 for guidance on implementation.

If a project chooses to monitor any pollutants more frequently than required by these protocols, the data must be reported to Ecology per a requirement of the NPDES Construction Stormwater General Permit. Section 6-8 of WSDOT's water quality monitoring protocols are designed to meet the NPDES permit requirements, and region environmental and HQ Environmental Services Office staff should be contacted if additional sampling will be performed.

## **6-8 NPDES General Construction Permit Sampling Procedures**

All project water quality monitoring forms, maps, and pictures of sampling stations must be kept in the Site Log Book along with copies of the contractors' inspection reports. The Site Log Book must be kept on-site to provide easy access for compliance inspections.

Prior to water quality sampling in the field, the responsible WSDOT personnel perform the following procedures:

### **1. Review Important Project Information and Assess Risk**

Review project maps, project definition, and schedule to understand when and where construction activities have the greatest potential to impact specific water quality parameters.

Projects that require turbidity sampling are as follows:

**Any WSDOT projects that disturb 5 acres or more of soil** when runoff from construction activities discharges to surface waters of the state or to a storm sewer system that drains to surface waters of the state.

Standard activities and project conditions that require pH sampling are as follows:

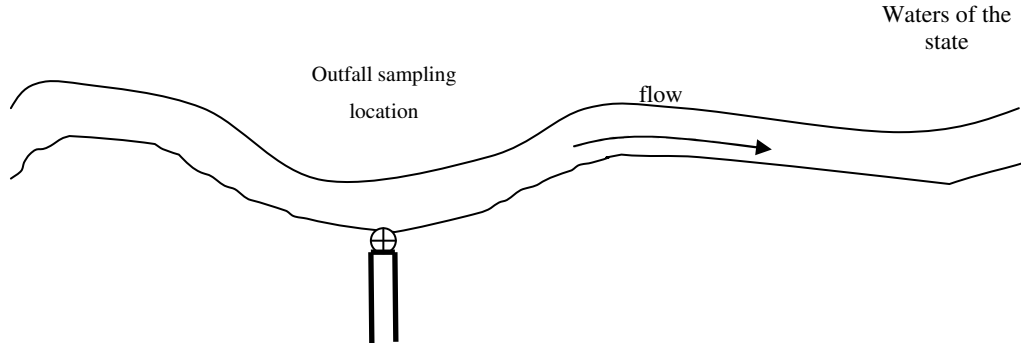
**Any WSDOT project that disturbs 1 acre or more, and involves greater than 1000 cubic yards of poured concrete curing simultaneously during a 30 day period, or greater than 1000 cubic yards of recycled concrete is crushed on-site, or the use of soils that are amended with cement or kiln dust** where stormwater from the affected area drains to surface waters of the state or to a storm sewer system that drains to surface waters of the state.

### **2. Establish Sampling Locations**

Establish sampling locations to determine construction stormwater outfall water quality conditions. Sites with multiple outfalls or stream crossings may require numerous sampling stations. Sampling is required at all discharge points where stormwater is discharged off-site. Locate and

clearly mark in the field sampling points according to the following criteria:

- **Discharge water quality.** Locate sampling point at the outfall to the receiving water. The sample should be collected before the construction stormwater enters the receiving water body. This sample should be evaluated for possible turbidity benchmark value exceedances, and steps identified in Procedure 3 below should be followed if benchmark value is exceeded. In cases where water directly discharges from the site through a traditional stormwater treatment BMP like a pond, sampling will occur at the outlet of the BMP. In cases where WSDOT provides additional treatment via dispersion within adjacent properties, discharges will be sampled after the additional treatment is provided.
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**Figure 6-5.1. General layout of NPDES General Construction Permit water quality sampling location.**

### **3. Establish Turbidity Sampling Schedule**

Establish a sampling schedule to ensure that monitoring is conducted during the high-risk periods.

Follow the schedule for turbidity sampling.

- **All WSDOT projects that disturb 5 acres or more of soil.** At a minimum, sample at least once every calendar week when there is a discharge of stormwater from the site to satisfy NPDES stormwater permit requirements. If the sample or visual observations indicate the potential for a water quality violation, perform contingency sampling (see section on contingency sampling). Samples must be representative of the flow and characteristics of the discharge. When there is no discharge during a calendar week, sampling is not required. Sampling is not required outside of normal working hours or during unsafe

conditions. A note should be made with a brief description of why a sample was not collected. Discharges to surface waters include (but are not limited to) draining of ponds, vaults, or footings, and flushing of water lines. During temporary suspension of construction, monitoring is also suspended if samples from three consecutive storm events meet water quality standards.

### **Turbidity Benchmark Values**

Benchmark values were created as indicators of properly functioning BMPs and are not discharge limitations. Discharges from construction sites less than 25 NTU are considered not likely to cause an exceedance of water quality standards under most conditions, and BMPs are thought to be functioning well. Construction site discharges between 26 and 249 NTU may cause an exceedance of water quality standards, and either the TESC plan has not been well implemented or BMPs are not functioning properly. A discharge greater than 250 NTU is likely to cause an exceedance of water quality standards under most conditions, and the TESC plan has not been well implemented and BMPs are not functioning properly. Therefore:

- a. If an outfall sample has a value greater than 25 NTU, but less than 250 NTU:
  - i. Review the TESC plan and make appropriate revisions within 7 days of the discharge that exceeded the benchmark; and
  - ii. Fully implement and maintain the BMPs as soon as possible, but within 10 days of the discharge that exceeded the benchmark, and document in the Site Log Book.
- b. If an outfall sample has a value greater than 250 NTU:
  - i. Notify Ecology by phone within 24 hours;
  - ii. Review the TESC plan and make appropriate revisions within 7 days of the discharge that exceeded the benchmark; and
  - iii. Fully implement and maintain the BMPs as soon as possible, but within 10 days of the discharge that exceeded the benchmark, and document in the Site Log Book.
  - iv. Continue to sample discharges daily until:
    1. Turbidity is 25 NTU or lower; or
    2. Compliance with water quality standards is achieved; or
    3. The discharge stops or is eliminated.

### **4. Establish pH Sampling Schedule**

Follow the schedules for the following project types if conducting pH sampling:

- **Sites with more than 1000 cubic yards of poured concrete curing simultaneously during a 30 day period, or greater than 1000 cubic yards of recycled concrete is crushed on-site.** pH monitoring should begin when the poured or recycled concrete is first exposed to precipitation and should continue at least once per week until stormwater pH is 8.5 or less.
- **Sites with soils amended with cement or kiln dust.** pH monitoring should begin when the soil amendments are first exposed to precipitation and should continue at least once per week until runoff from the area of amended soils meets water quality standards or the area is covered.

At least once per week, pH samples should be collected prior to discharge to surface waters from sediment traps or ponds storing runoff from the two areas described above. If the HQ “GSP for Treatment of pH for Concrete Work” is included in the contract, the contractor will be responsible for this monitoring.

Process water or wastewater (nonstormwater) that is generated on-site, including water generated during concrete grinding, rubblizing, washout, and hydrodemolition activities, cannot be discharged to waters of the state under the NPDES General Construction Permit. Offsite disposal of concrete process water must be in accordance with Standard Specification 5-01.3(11) of the. Under limited circumstances, infiltration of process water may be acceptable. As standards for dealing with process water are still evolving, contact the region’s environmental personnel and the HQ Water Quality Program to determine if infiltration is an acceptable option.

#### **pH Benchmark Values**

- a. The benchmark value for pH is 8.5 standard units. Anytime sampling indicates that pH is 8.5 or greater:
  - i. Prevent the high pH water (8.5 or above) from entering storm sewer systems or surface waters; and
  - ii. If necessary, adjust or neutralize the high pH in accordance with the HQ GSP for Treatment of pH for Concrete Work (<http://www.wsdot.wa.gov/eesc/design/projectdev/GSPS/egsp8.htm>).

In situations where the GSP does not appear adequate, contact the region’s environmental staff and the HQ Environmental Services Office for more information.



These offices can provide additional guidance for extreme situations where neutralizing the high pH water with dry ice or CO<sub>2</sub> sparging may be necessary.

## **5. Contingency Sampling**

Contingency sampling is required if visual observations suggest that turbidity or pH, benchmark values may be exceeded. If monitoring confirms that water quality is out of compliance with benchmark values, then additional samples should be taken to determine the duration and magnitude of the event. High pH water (over 8.5) should not be allowed to discharge. Once compliance with benchmark values is achieved (turbidity less than 25 NTU, pH between 6.5 and 8.5), the project shall return to its standard sampling schedule. If more than ten contingency samples are collected in one day, contact the HQ Environmental Services Office, Water Quality Program.

## **6-9 In-Water Work Monitoring**

WSDOT monitors water quality on 20% of in-water work projects. Water quality monitoring must be done in accordance with these protocols and other project permits. If permit requirements vary from these protocols, contact the region's environmental staff or the HQ Environmental Services Office. Reporting of data must be in accordance with Sections 6-6 and 6-7 of these protocols, along with reporting required by permit conditions.

- **In-water work.** Such projects require work below the ordinary high water mark of state water bodies.

### **1. Verify Classification and Water Quality Standards**

Verify the classification and water quality standards for potentially impacted water bodies according to state of Washington surface water quality standards ([WAC 173-201A](#)). Region environmental personnel should be contacted for assistance if necessary.

### **2. Preconstruction Baseline Sampling**

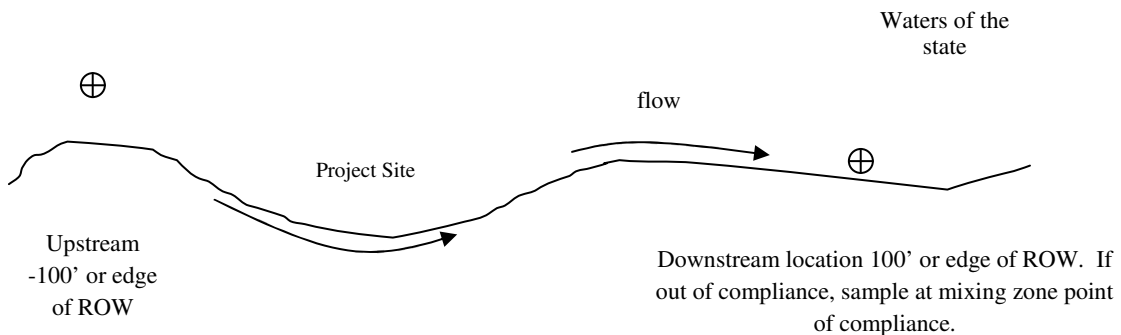
Prior to beginning compliance monitoring, baseline water sampling is required to establish background water quality characteristics. It is important to show the existing water quality conditions both above and below the site prior to construction, as natural streambank erosion or preexisting stormwater outfalls from adjacent properties may cause differences between proposed monitoring points. Whenever possible, baseline monitoring should be performed during a rainstorm no more than one month prior to the start of construction.

One sampling event is adequate (unless conditions are variable), in which up to three samples can be collected.

### 3. Establish Sampling Locations

Establish sampling locations to determine background and downstream water quality conditions. Locate and clearly mark in the field sampling points according to the following criteria:

- **Background condition.** Locate background sampling locations where water bodies enter the right-of-way, or 100 feet upstream of construction activities, whichever is closer.
- **Downstream impacts.** Sample 100 feet downstream of the construction activity or at the edge of the right-of-way, whichever is closer. If a mixing zone is allowed per Ecology's permit, and if the sample collected 100 feet downstream of construction activities is out of compliance with water quality standards, sample at the mixing zone compliance point designated by Ecology. If out of compliance with water quality standards, file ECAP.



**Figure 6-5.2. General layout of typical in-water work sampling locations.**

### 4. Establish Sampling Schedule

Establish a sampling schedule to ensure that monitoring is conducted when necessary.

Follow the schedule for conducting turbidity sampling.

- **In-water work.** Sample daily during in-water work activities. One upstream/downstream sample should be collected after work begins each day. If that sample meets standards and visual inspections reveal no change in water quality throughout the day, no further sampling is required. If work activities change during the day (removing piles in the morning and driving piles in the afternoon), another upstream/downstream sample should be collected after work activities change. If standards are met and visual inspections reveal no change in water quality, then no

further sampling is required. If visual inspection reveals a change in water quality, then contingency sampling should occur.

Follow the schedule for conducting pH sampling.

- Whenever water comes in contact with curing concrete, a pH sample must be taken prior to discharge. If the pH is less than 8.5 pH units, the water can be discharged, followed by an upstream and downstream sample to verify that water quality standards are achieved. If water quality standards are not achieved, file ECAP. If the pH is greater than 8.5 pH units, the water cannot be discharged to waters of the state. This water must be treated, infiltrated, or sent to a sanitary sewer system. Contact the region's environmental personnel or the HQ Environmental Services Office for more information.

## **5. Contingency Sampling**

If there is a visual change in receiving water turbidity due to work activities or a potential increase in pH, contingency sampling is required. If monitoring confirms that water quality is out of compliance with water quality standards, then additional samples should be taken to determine the duration and magnitude of the event. Once compliance with water quality standards is achieved the project shall return to its standard sampling schedule. If more than ten contingency samples are collected in one day, contact region environmental or the HQ Environmental Services Office, Water Quality Program.